

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
10 March 2005 (10.03.2005)

PCT

(10) International Publication Number
WO 2005/021421 A2

(51) International Patent Classification⁷:

C01B

(21) International Application Number:

PCT/US2004/026951

(22) International Filing Date: 20 August 2004 (20.08.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

60/496,840 21 August 2003 (21.08.2003) US
60/534,434 6 January 2004 (06.01.2004) US

(71) Applicant (for all designated States except US): **PEARSON TECHNOLOGIES, INC.** [US/US]; 20088 Norm Connell Drive, Aberdeen, MS 39730 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **PEARSON, Stanley, R.** [US/US]; 544 S. Lakeview Drive, Baton Rouge, LA 70810-4631 (US).

(74) Agent: **DOLCE, Marcus, P.**; Price, Heneveld, Cooper, DeWitt & Litton, LLP, 695 Kenmoor, S.E., P.O. Box 2567, Grand Rapids, MI 49501-2567 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

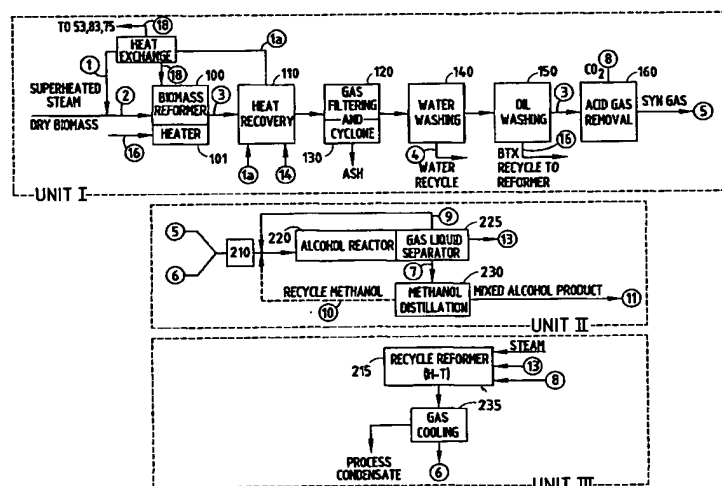
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished upon receipt of that report

[Continued on next page]

(54) Title: PROCESS AND APPARATUS FOR THE PRODUCTION OF USEFUL PRODUCTS FROM CARBONACEOUS FEEDSTOCK



(57) Abstract: A carbonaceous feedstock to alcohol conversion process in which carbon dioxide is removed from the syngas stream issuing from a feedstock reformer, to yield a carbon dioxide depleted syngas stream including hydrogen, carbon monoxide and methane. This carbon dioxide depleted syngas stream is then passed through a Fischer-Tropsch reactor ultimately yielding a mixed alcohol product which is preferably largely ethanol. The removed carbon dioxide stream is passed through a methane reformer along with methane, which is produced in or has passed through a Fischer-Tropsch reactor, to yield primarily carbon monoxide and hydrogen. The carbon monoxide and hydrogen stream from the methane reformer are passed through the alcohol reactor. Also disclosed are a unique catalyst, a method for controlling the content of the syngas formed in the feedstock reformer, and a feedstock handling system.



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
10 March 2005 (10.03.2005)

PCT

(10) International Publication Number
WO 2005/021421 A3

(51) International Patent Classification⁷: **C07C 27/00**,
1/02, B01D 50/00, B01J 10/00, 8/08, 7/00, B01D 11/02,
A61L 2/00, B01J 23/00

(21) International Application Number:
PCT/US2004/026951

(22) International Filing Date: 20 August 2004 (20.08.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/496,840 21 August 2003 (21.08.2003) US
60/534,434 6 January 2004 (06.01.2004) US

(71) Applicant (for all designated States except US): **PEARSON TECHNOLOGIES, INC.** [US/US]; 20088 Norm
Connell Drive, Aberdeen, MS 39730 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **PEARSON, Stanley, R.** [US/US]; 544 S. Lakeview Drive, Baton Rouge, LA
70810-4631 (US).

(74) Agent: **DOLCE, Marcus, P.**; Price, Heneveld, Cooper,
DeWitt & Litton, LLP, 695 Kenmoor, S.E., P.O. Box 2567,
Grand Rapids, MI 49501-2567 (US).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,
SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments

(88) Date of publication of the international search report:
21 April 2005

For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: PROCESS AND APPARATUS FOR THE PRODUCTION OF USEFUL PRODUCTS FROM CARBONACEOUS
FEEDSTOCK

(57) Abstract: A carbonaceous feedstock to alcohol conversion process in which carbon dioxide is removed from the syngas stream
issuing from a feedstock reformer, to yield a carbon dioxide depleted syngas stream including hydrogen, carbon monoxide and
methane. This carbon dioxide depleted syngas stream is then passed through a Fischer-Tropsch reactor ultimately yielding a mixed
alcohol product which is preferably largely ethanol. The removed carbon dioxide stream is passed through a methane reformer
along with methane, which is produced in or has passed through a Fischer-Tropsch reactor, to yield primarily carbon monoxide and
hydrogen. The carbon monoxide and hydrogen stream from the methane reformer are passed through the alcohol reactor. Also
disclosed are a unique catalyst, a method for controlling the content of the syngas formed in the feedstock reformer, and a feedstock
handling system.

WO 2005/021421 A3